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(54) Title of the Invention: DOUBLE-SIDE IMAGE-FORMATION  
APPARATUS

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#### SPECIFICATION

1. Title of the Invention: DOUBLE-SIDE IMAGE-FORMATION  
APPARATUS

#### 2. Claims

(1) A double-side image-formation apparatus including upper and lower casing components which are divided from each other with respect to a paper-conveying path extending from a paper feeder to a catch tray, the upper casing component being attached to the lower casing component in an openable and closable manner; reversing conveying means for reversing paper having an image formed thereon; refeeding-paper conveying means for conveying the reversed paper to be

held by an intermediate tray; and a paper-refeeding unit for refeeding the held paper into an image-formation unit,

wherein the double-side image-formation apparatus comprises a first frame including a lower conveying element of the reversing conveying means and an upper conveying element of the refeeding-paper conveying means, the first frame being disposed in the lower casing component in a vertically pivotable manner around a section near a path-inverting portion of the reversing conveying means; a second frame including a lower conveying element of the refeeding-paper conveying means, the second frame being disposed on the lower casing component in a vertically movable manner via a quadruple link mechanism such that the second frame is capable of switching the upper and lower conveying elements of each of the conveying means between conveying positions and non-conveying positions; and position-maintaining means for maintaining the conveying elements in the conveying positions, the position-maintaining means capable of being switched so as to unlock a maintaining state.

(2) The double-side image-formation apparatus according to Claim 1, wherein the position-maintaining means includes a protrusion and a depression respectively provided in a free end portion of the first frame and a portion of the second frame corresponding to the free end portion of the first frame, wherein the second frame and the lower casing

component are pivotally linked with each other via a set of link members so as to define the quadruple link mechanism, and wherein, when the protrusion and the depression are to be engaged with each other so that the position-maintaining means is set in a position-maintaining state, a pivotal axis of each link member with respect to the second frame slightly passes over a corresponding dead point.

### 3. Detailed Description of the Invention

#### [ Technical Field ]

The present invention relates to double-side image-formation apparatuses, such as double-side copying apparatuses, that are capable of forming images on both front and back sides of paper.

#### [ Background Art ]

In an example of a copying apparatus that can perform a double-side copying operation, an apparatus casing is provided such that the apparatus casing is divided into upper and lower casing components with respect to a paper-conveying path extending from a paper feeder, such as a paper-feeding cassette or a manual paper-feeder, to a catch tray. Specifically, the upper casing component is attached to the lower casing component in an openable and closable manner. Furthermore, the copying apparatus is provided with reversing conveying means for reversing (flipping over) each sheet of paper having an image formed thereon; refeeding-

paper conveying means for conveying the reversed paper to be held by an intermediate tray; and a paper-refeeding unit for refeeding the held paper into an image-formation unit.

According to this structure, each sheet of paper having an image copied on one side thereof is discharged onto the intermediate tray in a face-up state (a state where the copied side is faced upward). The paper is subsequently re-fed into a transferring unit so that an image is copied on the reverse side of the paper. Finally, the paper with double-copied sides is ejected onto the catch tray.

According to such a double-side copying apparatus, since the paper-conveying path extending from the paper feeder to the catch tray is simple-structured, the rate of occurrence of paper jams in this path is extremely low. In contrast, since a conveying path of the reversing conveying means and the refeeding-paper conveying means that leads to the paper-refeeding unit is complicated, most paper jams occur in the conveying path of these conveying means.

Conventionally, as shown in Fig. 4, an upper casing component 53a disposed above a paper-conveying path b extending from a paper feeder 51 to a catch tray 52 is provided with reversing conveying means 54 for reversing (flipping over) each sheet of paper having an image copied on one side thereof. On the other hand, a lower casing component 53b is provided with refeeding-paper conveying

means 56 for conveying the reversed paper to be held by a paper-refeeding unit 55 provided in the lower casing component 53b. If a paper jam occurs in the reversing conveying means 54, the upper casing component 53a may be opened so that the paper stuck in the narrow conveying path can be pulled out. On the other hand, if a paper jam occurs in the refeeding-paper conveying means 56, upper and lower conveying elements 56a, 56b may be opened so that the paper jam can be cleared.

[Problems to be Solved by the Invention]

However, since the sections with a high rate of occurrence of paper jams are at different locations, both the reversing conveying means 54 and the refeeding-paper conveying means 56 must be checked for paper jams regardless of whether a paper jam is present at the reversing conveying means 54 or the refeeding-paper conveying means 56. This means that the conveying means 54 and the conveying means 56 disposed at different positions must both be opened. Especially in a case where a small-size paper is jammed in the path extending from the conveying means 54 to the conveying means 56, it may be difficult to clear the paper jam even if both conveying means 54 and 56 are opened. Accordingly, in view of this problem, the conventional structure is subject to further improvement.

It is therefore an object of the present invention to

provide a double-side image-formation apparatus in which a highly rational improvement is made so that the above-mentioned problem can be solved.

[ Means for Solving the Problems]

In order to achieve the above-mentioned object, the present invention provides a double-side image-formation apparatus that includes a first frame including a lower conveying element of reversing conveying means and an upper conveying element of refeeding-paper conveying means, the first frame being disposed in a lower casing component in a vertically pivotable manner around a section near a path-inverting portion of the reversing conveying means; a second frame including a lower conveying element of the refeeding-paper conveying means, the second frame being disposed on the lower casing component in a vertically movable manner via a quadruple link mechanism such that the second frame is capable of switching the upper and lower conveying elements of each of the conveying means between conveying positions and non-conveying positions; and position-maintaining means for maintaining the conveying elements in the conveying positions, the position-maintaining means capable of being switched so as to unlock a maintaining state.

[ Advantages]

According to the structure described above, when the position-maintaining means is switched so as to unlock the

maintaining state, the upper and lower conveying elements of each of the conveying means are switched to the non-conveying positions. Thus, a large triangular space beneath the path-inverting portion is formed between the first frame and the second frame, and moreover, a large triangular space is also formed above a free end portion of the first frame.

Alternatively, by lifting the free end portion of the first frame, a large rectangular space may be formed between the first frame and the second frame.

[ Embodiment ]

An embodiment according to the present invention will now be described with reference to the drawings.

Fig. 1 illustrates a double-side copying apparatus, which is an example of a double-side image-formation apparatus. The double-side copying apparatus is provided with an apparatus casing 3, which includes an original-manuscript setting base 1 and an original-manuscript holder 2 and also contains a photoreceptor 4 bridged laterally across the apparatus casing 3. Around the photoreceptor 4 are disposed an electrification unit 5, two developing units 6 storing developing solutions of different colors, a transferring unit 7, a paper-separating unit 8, and a cleaning unit 9. Furthermore, an upper space of the apparatus casing 3 is provided with an optically movable exposure unit 10. Moreover, the double-side copying

apparatus is further provided with a paper-feeding conveyor unit 12 for conveying each sheet of paper a stored in one of upper and lower cassette paper-feeders 11 to the transferring unit 7; a paper-ejecting conveyor unit 14 for conveying each separated sheet of paper a having an image transferred thereto towards a fixing unit 13; and a pair of paper-ejecting rollers 16 for ejecting each sheet of paper a having an image fixed thereon towards a catch tray 15.

The apparatus casing 3 is divided into upper and lower casing components with respect to a paper-conveying path b extending from the upper paper-feeding cassette 11 to the catch tray 15. Specifically, one of the casing components, that is, an upper casing component 3a, is attached to the other casing component, i.e. a lower casing component 3b, in an openable and closable manner with respect to an axis P. A lower portion of the lower casing component 3b is provided with a paper-refeeding unit 17; reversing conveying means 18 for reversing (flipping over) each sheet of paper a having an image copied on one side thereof; and refeeding-paper conveying means 19 for conveying the reversed paper a to the paper-refeeding unit 17 so that the paper a is held by the paper-refeeding unit 17. The refeeding-paper conveying means 19 is disposed in the lower casing component 3b at a position higher than the paper-refeeding unit 17. Each sheet of reversed paper a held by the paper-refeeding unit



17 is re-fed into the paper-feeding conveyor unit 13 via a conveying unit 20. By switching the conveying path using a first path-switching mechanism 21, each sheet of paper a having an image copied on one side thereof can selectively be ejected onto the catch tray 15 or be discharged towards the paper-refeeding unit 17 so as to be re-fed into the transferring unit.

Referring to Fig. 2, the paper-refeeding unit 17 includes an intermediate tray 22 (having an inclined tray component 22a and a horizontal tray component 22b which continues from the inclined tray component 22a and serves also as a bottom plate of the lower casing component 3b) which temporarily holds the paper a having an image copied on one side thereof. The paper-refeeding unit 17 further includes a positional restricting member 23 disposed at a downstream side of the intermediate tray 22 with respect to a refeeding direction. The positional restricting member 23 restricts the movement of the leading end of the held paper a so as to align the leading end of the paper a, and moreover, is capable of releasing the restriction at a predetermined timing. The paper-refeeding unit 17 further includes a width-alignment mechanism 24 for aligning the width of the paper a whose leading end is restricted from moving. The paper-refeeding unit 17 is further provided with double-feeding prevention means 25 (including an upper

feeding roller 25a and a lower double-feeding prevention roller 25b) disposed at the downstream side of the positional restricting member 23; and a refeeding roller 26 for conveying each sheet of paper a held by the intermediate tray 22 towards the double-feeding prevention means 25.

The structure of the reversing conveying means 18 will now be described in detail. The reversing conveying means 18 includes a first frame 27 having substantially half the length of the intermediate tray 22 and being disposed in a vertically pivotable manner around a shaft 28 provided below the pair of paper-ejecting rollers 16. A pivoting base portion of the first frame 27, a free end portion of the first frame 27, and an intermediate portion of the first frame 27 with respect to the longitudinal direction thereof each have a roller 29 attached thereto. A plurality of endless belts 30 is wound around these rollers 29 and is arranged in rows with respect to the width direction of the first frame 27. Furthermore, the first frame 27 is provided with rib members c each of which is slightly projected upward through a space between the adjacent endless belts 30.

A roller 31 is disposed above the roller 29 proximate the pivoting base portion in a manner such that the roller 31 can be switched to come into and out of contact with the endless belts 30 at a predetermined timing. Moreover, a paper-receiving unit 32 formed of a rod-like material is

disposed adjacent to the double-feeding prevention means 25 in a vertically pivotable manner. Specifically, a free end portion of the paper-receiving unit 32 is supported by a supporting member 33 which is attached to the free end portion of the first frame 27.

By switching the first path-switching mechanism 21 to a state shown with an imaginary line in Fig. 2 and switching a second path-switching mechanism 34 to a state shown with a solid line, each sheet of paper a is pushed into a space between the roller 31 and a first conveying end portion of the endless belts 30 constantly rotating in the refeeding direction (that is, in the counterclockwise direction in the drawing). Thus, the paper a is drawn towards the rib members c so as to be introduced into a reversing path. In a case where the paper a is large lengthwise, the leading end portion of the paper a is supported by the paper-receiving unit 32.

When the roller 31 is switched so as to come into contact with the endless belts 30 at the predetermined timing, the paper a introduced in the reversing path is nipped between the roller 31 and the endless belts 30 rotating in the refeeding direction. Thus, the paper a having an image copied on one side thereof is conveyed in a reversing manner, whereby the paper a is reversed (flipped) and is fed into the refeeding-paper conveying means 19.

In other words, the roller 31 and an upper conveying side of the endless belts 30 respectively define upper and lower conveying elements 18a and 18b, such that these conveying elements 18a and 18b constitute the reversing conveying means 18 for reversing the paper a having an image copied on one side thereof.

On the other hand, the refeeding-paper conveying means 19 has the following structure.

In detail, a set of brackets 35 is disposed below the first frame 27 in the lower casing component 3b and is arranged in the refeeding direction. The set of brackets 35 pivotally supports a set of link members 36, respectively. The set of link members 36 is pivotally connected to a second frame 37. Accordingly, the second frame 37, the set of link members 36, and the lower casing component 3b constitute a quadruple link mechanism 38 that allows the second frame 37 to move parallel in the vertical direction. The second frame 37 is provided with rollers 39 that are respectively opposed to the corresponding rollers 29. The rollers 39 come into contact with the endless belts 30 when a pivotal axis  $P_1$  of each link member 36 with respect to the second frame 37 slightly passes over a corresponding dead point  $P_2$  in response to lifting of the second frame 37. Moreover, position-maintaining means 40 is provided for maintaining the second frame 37 in the lifted position.

Furthermore, the second frame 37 is further provided with path-switching claws 41 each disposed between the adjacent rollers 39.

The position-maintaining means 40 includes a protrusion d and a depression e respectively provided in the free end portion of the first frame 27 and a portion of the second frame 37 corresponding to the free end portion of the first frame 27. The protrusion d and the depression e are engaged with each other in a state where each pivotal axis  $P_1$  is slightly over the corresponding dead point  $P_2$ , such that the second frame 37 is maintained at its lifted position. In other words, the protrusion d and the depression e maintain the contact state between the rollers 39 and the endless belts 30. In this maintained state, a lower conveying side of the endless belts 30 and the rollers 39 respectively define upper and lower conveying elements 19a and 19b, such that these conveying elements 19a and 19b constitute the refeeding-paper conveying means 19 whose first conveying end continuously connects with a path-inverting portion 18c of the reversing conveying means 18.

When the reversed paper a from the reversing conveying means 18 is received by the refeeding-paper conveying means 19, the paper a is discharged onto the intermediate tray 22 from a second conveying end of the refeeding-paper conveying means 19 if the paper a is short in length, whereas the

paper a is discharged onto the intermediate tray 22 via a predetermined one of the path-switching claws 41 projected in the conveying path if the paper a is large lengthwise. Subsequently, the paper a is re-fed into the transferring unit 7, whereby a double-side copying operation can be performed.

Alternatively, if the second path-switching mechanism 34 is switched to a state shown with an imaginary line in Fig. 2, the paper a having an image copied on one side thereof is discharged onto the intermediate tray 22 without passing through the reversing conveying means 18. Subsequently, the paper a is re-fed into the transferring unit 7, whereby a composite copying operation can be performed.

In the above-mentioned structure, if the paper a to be discharged onto the intermediate tray 22 jams before reaching the intermediate tray 22, the position-maintaining means 40 is switched so as to unlock the maintaining state, whereby the second frame 37 is lowered as shown in Fig. 3.

In response to the lowering of the second frame 37, the first frame 27 of the reversing conveying means 18 pivots downward around the shaft 28, and similarly, the paper-receiving unit 32 also pivots downward. Consequently, this forms a large triangular space above the first frame 27 and the paper-receiving unit 32. On the other hand, below the

first frame 27 is also formed a large triangular space extending below the path-inverting portion 18c.

Alternatively, by lifting the free end portion of the first frame 27, a rectangular space may be formed below the first frame 27.

Accordingly, a paper jam occurring in a conveying section of the reversing conveying means 18 or a paper jam occurring in a conveying section of the refeeding-paper conveying means 19 can be readily cleared. Specifically, due to the ability to form a large space below the path-inverting portion 18c of the first frame 27, a paper jam occurring in a conveying section between the reversing conveying means 18 and the refeeding-paper conveying means 19 can be cleared, or a paper jam occurring between a moving conveying section of the reversing conveying means 18 and the conveying section of the refeeding-paper conveying means 19 can be readily cleared via the large spaces.

In other words, if the paper a to be discharged onto the intermediate tray 22 jams at multiple conveying sections (four sections mentioned above) before reaching the intermediate tray 22, such paper jams can be cleared readily in one area near the paper-refeeding unit 17.

Although the above embodiment describes an example of a type of a xerographic copying apparatus that can perform a composite copying operation in addition to a double-side

copying operation, the above embodiment may also apply to a type of a xerographic copying apparatus that is not provided with a composite copying function. Furthermore, the scope of the present invention may include various types of image-formation apparatuses.

[ Industrial Applicability]

Accordingly, in the double-side image-formation apparatus according to the present invention, the reversing conveying means and the refeeding-paper conveying means are both provided in the lower casing component. Moreover, the double-side image-formation apparatus according to the present invention is characterized in that spaces can be formed above the first frame included in the reversing conveying means and between the first frame and the second frame included in the refeeding-paper conveying means, such that these spaces allow the reversing conveying means and the refeeding-paper conveying means to be switched to non-conveying positions. Due to the formation of such spaces, even when a paper jam occurs in any of the conveying sections of the reversing conveying means and the refeeding-paper conveying means, or even when a paper jam occurs in the path-inverting portion between the reversing conveying means and the refeeding-paper conveying means, the paper jam can be readily cleared in one area.

As an alternative structure, the second frame may be



pivotally attached to a section near the path-inverting portion so that a paper jam occurring in the refeeding-paper conveying means can be readily cleared. However, in such a structure, the space in the path-inverting portion between the first and second frames is narrow, and due to this reason, the clearing process of a paper jam occurring in the path-inverting portion becomes difficult.

On the other hand, according to the structure of the present invention, the second frame is disposed in a vertically movable manner via the quadruple link mechanism so that a large space beneath the path-inverting portion can be formed between the first frame and the second frame. This allows for an easy clearing process of a paper jam occurring in the path-inverting portion. Accordingly, with a simple improvement in the overall structure, the clearing process of paper jams can be readily performed in one area, whereby a non-conventional user-friendly image formation apparatus is achieved.

#### 4. Brief Description of the Drawings

Fig. 1 is a schematic vertical sectional view of a double-side copying apparatus, which is an example of a double-side image-formation apparatus; Fig. 2 illustrates reversing conveying means and refeeding-paper conveying means; Fig. 3 illustrates a state where conveying elements of the reversing conveying means and conveying elements of

the refeeding-paper conveying means are switched to non-conveying positions; and Fig. 4 is a schematic vertical sectional view of a conventional double-side copying apparatus.

- 3a: upper casing component
- 3b: lower casing component
- 11: paper feeders
- 15: catch tray
- 17: paper-refeeding unit
- 18: reversing conveying means
- 18a, 18b: conveying elements of reversing conveying means
- 18c: path-inverting portion
- 19: refeeding-paper conveying means
- 19a, 19b: conveying elements of refeeding-paper conveying means
- 22: intermediate tray
- 27: first frame
- 36: link member
- 37: second frame
- 38: quadruple link mechanism
- 40: position-maintaining means
- P<sub>1</sub>: pivotal axis
- P<sub>2</sub>: dead point
- a: paper

b: paper-conveying path

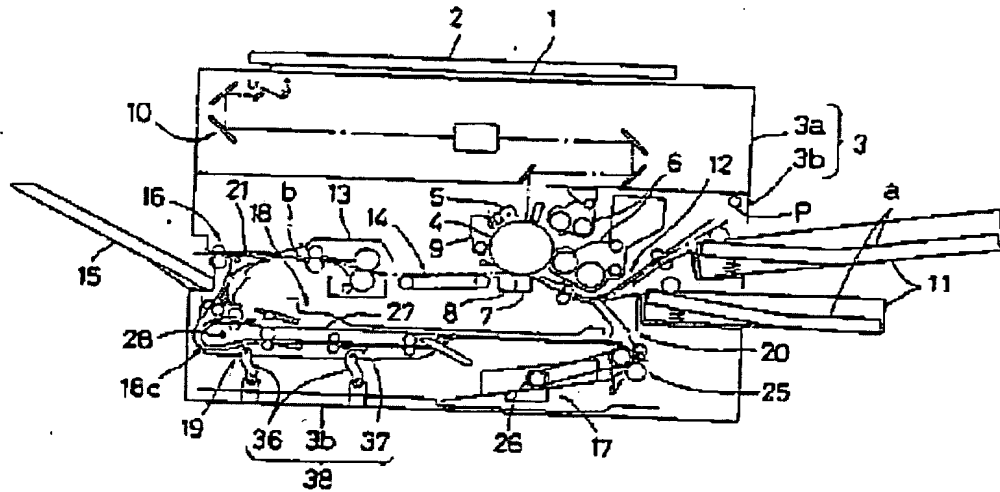
d: protrusion

e: depression

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第 1 図 FIG. 1



3a: UPPER CASING COMPONENT

3b: LOWER CASING COMPONENT

11: PAPER FEEDERS

15: CATCH TRAY

17: PAPER-REFEEDING UNIT

18: REVERSING CONVEYING MEANS

18c: PATH-INVERTING PORTION

19: ストック時紙送り手段

21: 中間トレイ

22: 四重リンク機構

23: 位置保持手段

24: 紙

25: 紙の搬送経路

26: 紙の搬送経路

19: ストック時紙送り手段

21: 中間トレイ

22: 四重リンク機構

23: 位置保持手段

24: 紙

25: 紙の搬送経路

26: 紙の搬送経路

19: REFEEDING-PAPER CONVEYING MEANS

22: INTERMEDIATE TRAY

38: QUADRUPLE LINK MECHANISM

40: POSITION-MAINTAINING MEANS

a: PAPER

b: PAPER-CONVEYING PATH

15: CATCH TRAY

17: PAPER-REFEEDING UNIT

18: REVERSING CONVEYING MEANS

18a, 18b: CONVEYING ELEMENTS OF

REVERSING CONVEYING MEANS

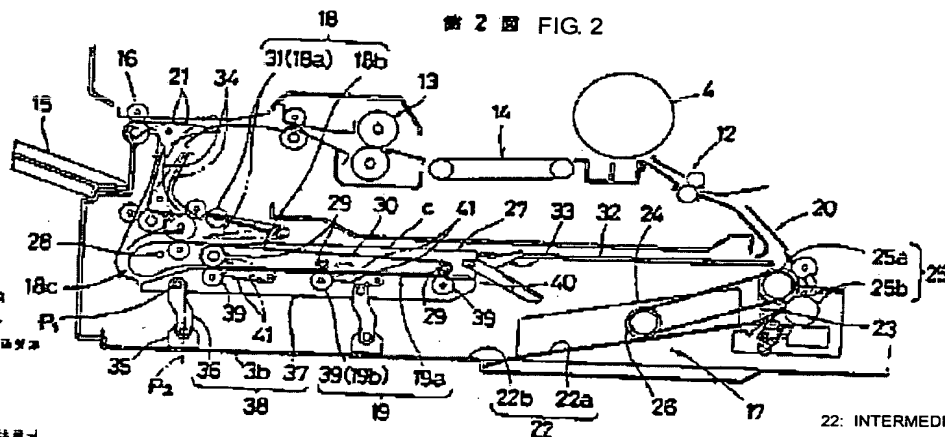
18c: PATH-INVERTING PORTION

19: REFEEDING-PAPER CONVEYING MEANS

19a, 19b: CONVEYING ELEMENTS OF

REFEEDING-PAPER CONVEYING MEANS

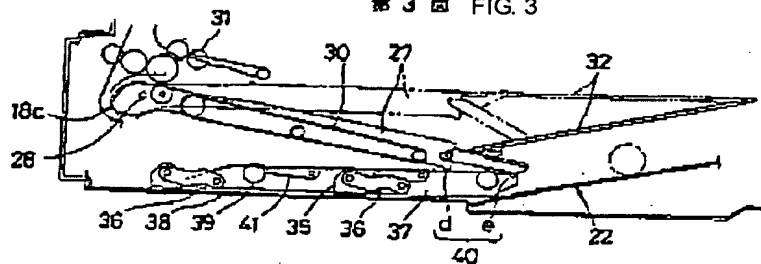
第 2 図 FIG. 2



15: 紙受けトレイ  
17: 紙送り装置  
18: スイッチバック送り手段  
18a, 18b: スイッチバック送り手段の搬送要素  
18c: 経路逆転部  
19: ストック時紙送り手段  
19a, 19b: ストック時紙送り手段の搬送要素

22: 中間トレイ  
27: 第一フレーム  
36: リンク  
37: 第二フレーム  
38: 四重リンク機構  
40: 位置保持手段  
P<sub>1</sub>: 枢軸  
P<sub>2</sub>: 死点  
d: 突出部  
e: 凹部

第 3 図 FIG. 3



22: INTERMEDIATE TRAY

27: FIRST FRAME

36: LINK MEMBER

37: SECOND FRAME

38: QUADRUPLE LINK MECHANISM

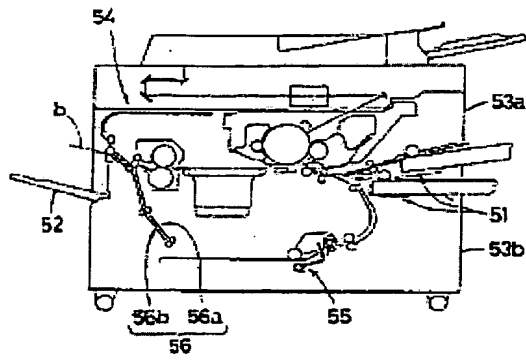
40: POSITION-MAINTAINING MEANS

P<sub>1</sub>: PIVOTAL AXISP<sub>2</sub>: DEAD POINT

d: PROTRUSION

e: DEPRESSION

第 4 図 FIG. 4



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# 明 細 書

## 1. 発明の名称

両面画像形成装置

## 2. 特許請求の範囲

(1) 給紙部から紙張トレイに至る通紙経路を埋しして二分された上部側の分割ケースを下部側の分割ケースに閉閉自在に連結すると共に、画像形成後の用紙をスイッチバックさせるスイッチバック搬送手段と、スイッチバック後の用紙を中間トレイにストックさせるストック給紙搬送手段、及び、ストックされた用紙を画像形成部に再給紙する再給紙部を設けて成る両面画像形成装置において、前記スイッチバック搬送手段の下部側の搬送要素と前記ストック給紙搬送手段の上部側の搬送要素を備えた第1フレームを、前記下部側の分割ケースに対してスイッチバックの経路反転部近傍に上下移動自在に配置する一方、前記ストック給紙搬送手段の下部側の搬送要素を備えた第2フレームを、両連リンク機構を介して上下移動自在に下部側の分割ケースに設けて、各搬送手段の上下の搬

送要素を搬送姿勢にする状態と非搬送姿勢にする状態とに切り換え自在に構成し、更に、前記搬送要素を搬送姿勢に保持する姿勢保持手段を保持部自在に設けてあることを特徴とする両面画像形成装置。

(2) 前記姿勢保持手段が、第1フレームの遊端側部分とこれに対応する第2フレーム部分との間に形成された凸部と凹部とから成り、前記第2フレームと下部側の分割ケースを一對のリンクで相互連結して両連リンク機構が構成され、前記姿勢保持手段の凸部と凹部の嵌合による姿勢保持状態において、前記一對のリンクの第2フレームに対する枢支軸芯がデッドポイントを有し、越えるように構成してある請求項(1)に記載の両面画像形成装置。

## 3. 発明のその他の説明

(産業上の利用分野)

本発明は、用紙の裏面両面に対する画像形成が可能な例えば両面複写機などの両面画像形成装置に関する。

(従来の技術)

例えば両面複写が可能に構成された複写機として、手差し部や給紙カセット等の給紙部から非紙トレイに至る送紙経路を境にして搬送ケースを上下に二分し、上部側の分割ケースを下部側の分割ケースに対して開閉自在に運轉すると共に、画像形成後の用紙をスイッチバックさせるスイッチバック搬送手段と、スイッチバック後の用紙を中間トレイにストックさせるストック給紙搬送手段、及び、ストックされた用紙を画像形成部に再給紙する再給紙部を設けたものがある。

上記の構成によれば、片面複写後の用紙がフェースアップ姿勢（複写面が上向きの姿勢）で中間トレイに取り出されると共に、当該用紙が既写部に再給紙されることで用紙裏面側に対する複写が行われ、かつ、両面複写後の用紙が併置トレイに取り出される。

かかる両面複写機において、前記給紙部から併置部に至る送紙経路は単純な構成であってジャムの発生は極めて少ないのであるが、前記再給紙部に至るスイッチバック搬送手段とストック給紙搬

送手段の搬送経路は構成が複雑であって、ジャムが発生する多くは両搬送手段の搬送経路であると云っても過言ではない。

ところで従来は、第4図に示すように、給紙部51から併置トレイ52に至る送紙経路を境にして二分された上部側の分割ケース53aに、片面複写後の用紙をスイッチバックさせる搬送手段54を設けると共に、スイッチバック後の用紙を下部側分割ケース53bの再給紙部55にストック給紙させる搬送手段56を配設し、もって、前記スイッチバック搬送手段54でジャムが発生したときには、前記上部側の分割ケース53aを開放して、挟持搬送経路に詰まった用紙を引っ張り出し、ストック給紙搬送手段56でジャムが発生したときには、上下の搬送要素56a、56bを開放してジャム処理を行っている。

〔発明が解決しようとする課題〕

しかし、上記ジャムが発生し易い箇所が異なるために、ジャムの配設がスイッチバック搬送手段54とストック給紙搬送手段56の何れであっても、

両搬送手段54、56についてのジャム処理をする必要があることから、互いに異なる箇所を両搬送手段54、56を逐一開放しなければならず、特に、小さいサイズの用紙が両搬送手段54、56にわたってジャムした際には、当該両搬送手段54、56を開放してもジャム処理が困難な場合があり、改善の余地があった。

本発明は、極めて合理的な改良によって上記の不都合を解消した両面画像形成装置を提供することを目的としている。

〔課題を解決するための手段〕

上記の目的を達成するために本発明は、冒頭に記載した両面画像形成装置において、前記スイッチバック搬送手段の下部側の搬送要素と前記ストック給紙搬送手段の上部側の搬送要素を備えた第1フレームを、前記下部側の分割ケースに対してスイッチバックの経路反転部近傍に上下移動自在に取替する一方、前記ストック給紙搬送手段の下部側の搬送要素を備えた第2フレームを、四連リック機構を介して上下移動自在に下部側の分割ケ

ースに取付けて、各搬送手段の上下の搬送要素を搬送姿勢にする状態と非搬送姿勢にする状態とに切り換え自在に構成し、更に、前記搬送要素を搬送姿勢に保持する姿勢保持手段を保持解除自在に設けた点に特徴を有する。

〔作用〕

上記の特徴構成によれば、姿勢保持手段を保持解除の状態に切り換えて、両搬送手段の上下の搬送要素を非搬送姿勢にすることで、経路反転部近傍の下部側を広くする三角形の空間が第1及び第2フレーム間に形成されると共に、第1フレームの上部には、当該第1フレームの搬送要素上部を広くする三角形の空間が形成される。

あるいは、前記第1フレームの搬送要素を持ち上げることで、第1及び第2フレーム間に広い四角形状の空間が形成される。

〔実施例〕

以下、本発明の実施例を図面に基づいて説明する。

第1図は両面画像形成装置の一例の両面複写機

を承し、原稿載置台1と原稿押え2を備えた装置ケース3に感光体4を積装し、この感光体4のまわりに、帯電装置5、異なる色の現像剤を収容した2台の現像装置6、転写装置7、用紙分離装置8、クリーニング装置9を配置すると共に、前記装置ケース3の上部空間に先字系移動式の露光装置10を配置し、かつ、上下のカセット給紙部11に収容された用紙を前記転写装置7に搬送する給紙搬送装置12と、転写・分離後の用紙を定着装置13に搬送する排紙搬送装置14、及び、定着後の用紙を排紙トレイ15に排出する排紙ローラ16を設けてある。

そして、上部側のカセット給紙部11から排紙トレイ15に至る通紙経路を境にして前記装置ケース3を上下に二分すると共に、そのうちの上部側の分割ケース3aを下部側の分割ケース3bに対して軸線Pをわたりて開閉自在に連結する一方、前記下部側の分割ケース3bの下部に再給紙部17を設け、かつ、片面複写後の用紙をスイッチバックさせるスイッチバック搬送手段18と、該スイッチバ

クされた用紙を前記再給紙部17にストック給紙させるストック給紙搬送手段19と、前記下部側の分割ケース3bに対して前記再給紙部17の上部側に設けると共に、前記再給紙部17にストックされた用紙を前記給紙搬送装置13に合流給紙する搬送装置20を設けて、第1の経路切り換え機構21による搬送経路の変更によって、片面複写後の用紙を前記トレイ15に取り出す形態と、片面複写後の用紙を再給紙部17に取り出し且つ前記転写装置に再給紙させる形態とを選択できるように構成されている。

前記再給紙部17は、第2図にも示すように、前記片面複写後の用紙を一時的にストックする中間トレイ（傾斜トレイ部分22aと、これに連なり且つ下部側の分割ケース3bの底版で兼用構成された水平トレイ部分22bから成る）22の再給紙方向下流側に、前記用紙の先端位置を規制して先端揃えを成す位置規制具23を、所定のタイミングで規制解除自在に設けると共に、前記先端位置が規制された用紙の巾揃えを行うための巾揃え機構

24を設け、かつ、前記位置規制具23の下流側に搬送防止手段（上部側の給紙ローラ25aと下部側の搬送防止用ローラ25bから成る）25を配設すると共に、前記中間トレイ22上にストックされた用紙を前記搬送防止手段25に向けて再給紙するための再給紙ローラ26を設けて成る。

次に、前記スイッチバック搬送手段18の具体構造について説明すると、このスイッチバック搬送手段18は、前記中間トレイ22のはみ半分の長さを有する第1フレーム27を、前記排紙ローラ16の下部側の軸28をわたりて上下揺動自在に担着すると共に、該第1フレーム27の揺動基座側と遠端側および長手中間の穴々にローラ29を取り付け、かつ、このローラ29に巾方向複数個のエンドレスベルト30を巻回すると共に、該エンドレスベルト30の全周から上方に巾突出させる状態で前記第1フレーム27にリブ部材を立設してある。

そして、揺動基座側のローラ29の上部側に、所定のタイミングでエンドレスベルト30に当接する状態で切り換えられるローラ31を配置する一方、

棒状部材から成る紙受け部材32を前記搬送防止手段25の近傍に上下揺動自在に設け、かつ、この紙受け部材32の遠端側を前記第1フレーム27の遠端側に設けた受け部材33に柔軟支持させてある。

而して、前記第1経路切り換え機構21を第2図に仮想線で示す状態に且つ第2の経路切り換え機構34を実線で示す状態に夫々切り換えることで、常に反し給紙方向（図において反時計回り方向）に回転しているエンドレスベルト30の遠端端部とローラ31との間に、送紙状態で用紙が導入されると共に、当該用紙がリブ部材に拘束されるようにしてスイッチバック経路に導入され、かつ、用紙が長尺サイズの場合にはその先端側が紙受け部材32によって支持される。

そして、所定のタイミングで前記ローラ31が前記エンドレスベルト30に当接する状態に切り換えられると、前記スイッチバック経路に導入された用紙が、当該ローラ31と反し給紙方向に回転するエンドレスベルト30とで挟持されてスイッチバック搬送されることで、当該片面複写後の用紙を



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が裏面反転状態で前記ストック給紙搬送手段19に給紙される。

即ち、前記ローラ31とエンドレスベルト30の上部側搬送作用部を夫々上下の搬送要素18a、18bとして、前記片面複写後の用紙をスイッチバックさせるスイッチバック搬送手段18が構成されているのである。

一方、前記ストック給紙搬送手段19は次のように構成されている。

即ち、前記下部側の分割ケース3bに対して第1フレーム27の下部側に、給紙方向で一對のブラケット35を立設すると共に、このブラケット35に恒着された一對のリンク36に第2フレーム37を恒着連結して、当該第2フレーム37と一對のリンク36および前記下部側の分割ケース3bによって、前記第2フレーム37を上下に平行移動させる四連リンク機構38を構成し、前記一對のリンク36の第2フレーム37に対する恒支軸芯P<sub>2</sub>が、前記第2フレーム37の持ち上げに伴ってデッドポイントP<sub>2</sub>をやり越した時に、前記エンドレスベルト30に当接する

ローラ39を、前記ローラ29に相対させて第2フレーム37に設け、かつ、この第2フレーム37の持ち上げ姿勢を保持する姿勢保持手段40を設けると共に、前記ローラ39、39間の夫々に経路切り換え爪41を設けてある。

尚、前記姿勢保持手段40は、第1フレーム27の遠端側部分とこれに対応する第2フレーム37部分とに形成された凸部4と凹部とが互いに嵌合して、前記恒支軸芯P<sub>1</sub>がデッドポイントP<sub>1</sub>をやり越えた状態で前記凸部4と凹部とが互いに嵌合して、前記第2フレーム37の持ち上げ姿勢を保持し、延いては、前記エンドレスベルト30に対するローラ39の当接状態を保持するもので、この保持状態にあるエンドレスベルト30の下部側搬送作用部と前記ローラ39を夫々上下の搬送要素18a、18bとして、その搬送経路の始端部を前記スイッチバック搬送手段18の経路反転部18cに臨ませてストック給紙搬送手段19が構成されているのである。

而して、前記スイッチバック搬送手段18からのスイッチバック後の用紙がストック給紙搬送手

段19に取り出されると共に、当該用紙aのサイズが短い場合は搬送経路終端側から、或いは用紙サイズが長い場合は搬送経路に突出した所定の経路切り換え爪41の部位から、夫々中間トレイ22に取り出され、かつ、当該用紙aが前記転写装置7に再給紙されることで両面複写が行われる。

あるいは、前記第2経路切り換え機構34を第2図に仮想線で示す状態に切り換えている状態であれば、前記片面複写後の用紙は前記スイッチバック搬送手段18を遡らずに中間トレイ22に取り出されると共に、当該用紙aが転写装置7に再給紙されることで合成複写が行われるのである。

上記の構成によれば、前記中間トレイ22に取り出される用紙aが当該中間トレイ22に達するまでにジャムした場合、第3図に示すように、前記姿勢保持手段40を保持解除の状態に切り換えさせつつ前記第2フレーム37を下方に移動させるのである。

すると、この第2フレーム37の下降に伴って前記スイッチバック搬送手段18の第1フレーム27が

前記恒支軸28まわりで下方に回転すると共に、前記紙受け部材32も同様に下方に回転し、前記第1フレーム27と紙受け部材32の上部に広い三角形形状の空間が形成されると共に、前記第1フレーム27の下部側には、前記経路反転部18cの下部側を広くする三角形形状の空間、あるいは、前記第1フレーム27の遠端側を持ち上げることで四角形状の空間が形成される。

而して、前記スイッチバック搬送手段18の搬送系で生じたジャム処理や、前記ストック給紙搬送手段19の搬送系で生じたジャム処理を容易に行うことができ、特に、前記第1フレーム27の下部側においては経路反転部18cの下部側を広くする空間が形成されることで、前記スイッチバック搬送手段18からストック給紙搬送手段19の搬送系にわたって生じたジャム処理や、前記スイッチバック搬送手段18を迂回する搬送系から前記ストック給紙搬送手段19の搬送系にわたって生じたジャム処理を、上記の広い空間を通して容易に行うことができる。

即ち、前記中間トレイ22にストックすべき用紙aが中間トレイ22に送るまでの複数箇所（上記の例では4箇所）の搬送系で生じたジャム処理を前記両給紙部17の近傍の一箇所で行うことができるのである。

尚、上記の実施例では、両面複写の外に重ね合わせ複写を行えるタイプの静電写真複写機を例示したが、重ね合わせ複写機能を有しないタイプの静電写真複写機を対象に実施可能であり、その他各種の画像形成装置を本発明の実施対象にすることができる。

#### （発明の効果）

以上説明したように本発明の両面画像形成装置は、スイッチバック搬送手段とストック給紙搬送手段を一連にして下部側の分割ケースに設けると共に、前記スイッチバック搬送手段を構成する第1フレームの上部と、この第1フレームとストック給紙搬送手段を構成する第2フレームとの間に、夫々搬送手段を非搬送姿勢にする空間を形成可能にした点に特徴を有し、而して、上記の空間

することで、上記両搬送手段の何れの搬送系で生じたジャムであっても、あるいは、両搬送手段の搬送系にわたる経路反転部で生じたジャムであっても、その処理作業を一箇所で行うことができる。

あるいは、前記第2フレームを経路反転部の近傍に配置させる構成をとることで、前記ストック給紙搬送手段で生じたジャム処理を容易に行えるのであるが、かかる構成では、経路反転部近傍の第1及び第2フレーム間の空間が狭くて経路反転部でのジャム処理がやむを得ない。

しかし本発明では、前記第2フレームを四連リンク機構を介して上下移動自在に設けて、前記経路反転部の下部側を広くする空間を第1及び第2フレーム間に形成させるようにしているので、前記経路反転部でのジャム処理も容易に行えるのであり、全体として、簡易な改良技術によって、ジャム処理作業を一箇所で行うことができる従来のない使い勝手の良い画像形成装置を提供できるに資したのである。

#### 4. 図面の簡単な説明

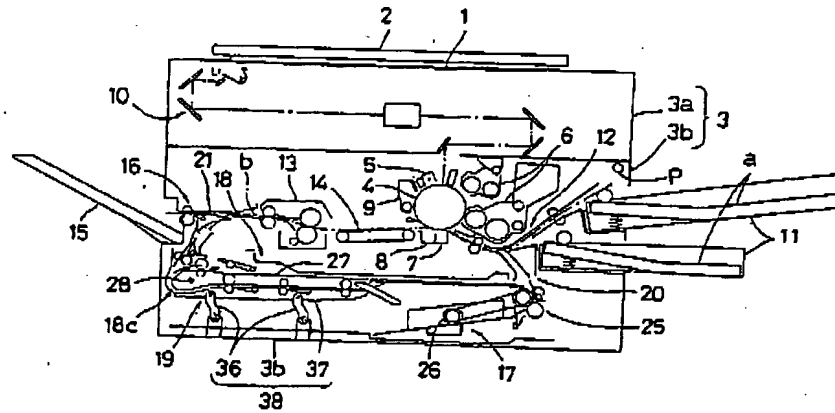
第1図は両面画像形成装置の一例の両面複写機の要部縦断側面図、第2図はスイッチバックならびにストック給紙の搬送手段を示す詳細図、第3図はスイッチバック搬送手段ならびにストック給紙搬送手段の搬送要素を非搬送姿勢に切り換えた状態の詳細図、第4図は従来例の両面複写機の概略縦断側面図である。

3a…上部側の分割ケース、3b…下部側の分割ケース、11…給紙部、15…排紙トレイ、17…両給紙部、18…スイッチバック搬送手段、18a、18b…スイッチバック搬送手段の搬送要素、19a…経路反転部、19b…ストック給紙搬送手段、19a、19b…ストック給紙搬送手段の搬送要素、22…中間トレイ、27…第1フレーム、35…リンク、37…第2フレーム、38…四連リンク機構、40…姿勢保持手段、P<sub>1</sub>…直支軸芯、P<sub>2</sub>…デッドポイント、a…用紙、b…送紙経路、d…凸部、e…凹部。

出 願 人 三田工業株式会社

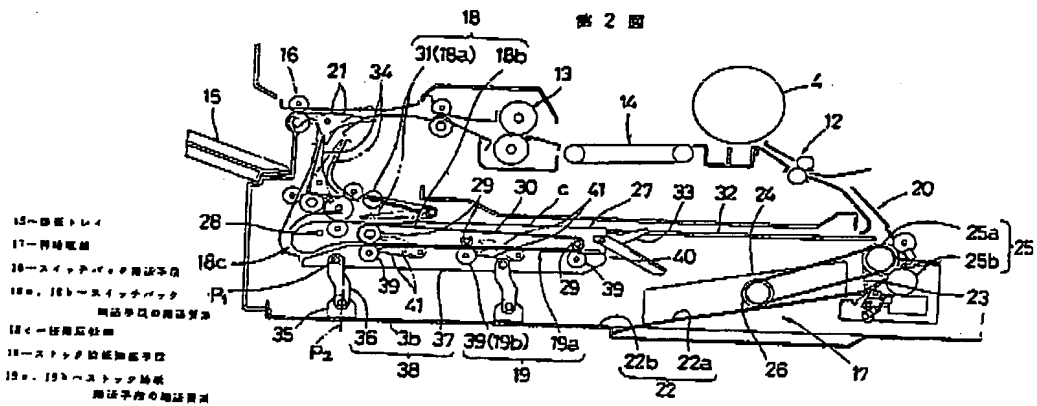
代 理 人 弁理士 藤本英夫

第 1 図



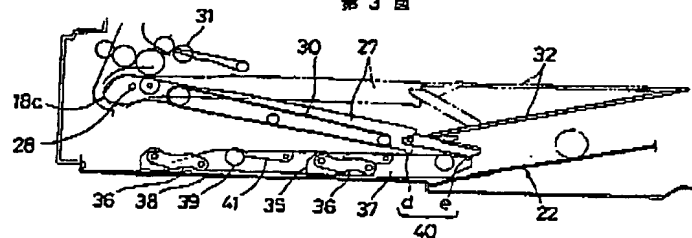
- |                |               |
|----------------|---------------|
| 3a—上部筐の分割ケース   | 19—ストップ時電磁石下部 |
| 3b—下部筐の分割ケース   | 22—中間トレイ      |
| 11—棒状部         | 23—両端リンク機構    |
| 15—振動トレイ       | 24—両端保持手段     |
| 17—両端電磁石       | a—凸部          |
| 18—スイッチバッチ開閉手段 | b—凹部          |
| 19—両端電磁石       |               |

第 2 図



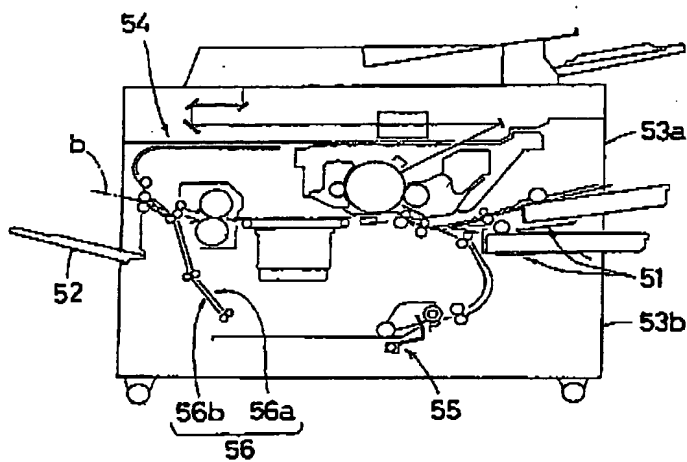
- |                          |
|--------------------------|
| 15—振動トレイ                 |
| 17—両端電磁石                 |
| 18—スイッチバッチ開閉手段           |
| 18a, 18b—スイッチバッチ開閉手段の両端部 |
| 18c—両端電磁石                |
| 19—ストップ時電磁石下部            |
| 19a, 19b—ストップ時電磁石下部の両端部  |

第 3 図



- |            |
|------------|
| 22—中間トレイ   |
| 23—両端リンク機構 |
| 24—両端保持手段  |
| 25a—両端電磁石  |
| 25b—両端電磁石  |
| 26—両端電磁石   |
| 27—両端電磁石   |
| 28—両端電磁石   |
| 29—両端電磁石   |
| 30—両端電磁石   |
| 31—両端電磁石   |
| 32—両端電磁石   |
| 33—両端電磁石   |
| 34—両端電磁石   |
| 35—両端電磁石   |
| 36—両端電磁石   |
| 37—両端電磁石   |
| 38—両端電磁石   |

第 4 図



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